NORTH CAROLINA DIVISION OF AIR QUALITY

Preliminary PSD Application Review

Issue Date: xx/xx/2018

Region: Fayetteville Regional Office
County: Montgomery
NC Facility ID: 6200015
Inspector's Name: Gregory Reeves
Date of Last Inspection: 05/11/2018
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Jordan Lumber & Supply, Co.

Facility Address:
Jordan Lumber & Supply, Co.
1959 Highway 109 South
Mount Gilead, NC 27306

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321912 / Cut Stock, Resawing Lumber, and Planing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0504, 02D .0503, 02D .0516, 02D .0521, 02D .0524, 2D .0515 and 02D .0530
NSPS: N/A
NESHAP: 15A NCAC 02D .1109: "112(j) Case-by-Case MACT," MACT Subpart DDDDD
PSD: BACT
PSD Avoidance: N/A
NC Toxics: 02D .1100
112(r): N/A
Other: CAM Rule (40 CFR Part 64)

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Susan Huneycutt Executive Assistant (910) 439-8119 PO Box 98 Mount Gilead, NC 27306	Robert Jordan IV Vice President / General Manager (910) 439-8108 PO Box 98 Mt. Gilead, NC 27306	Susan Huneycutt Executive Assistant (910) 439-8119 PO Box 98 Mount Gilead, NC 27306

Application Data

Application Number: 6200015.18A
Date Received: 05/22/2018
Application Type: Modification
Application Schedule: PSD

Existing Permit Data

Existing Permit Number: 03469/T26
Existing Permit Issue Date: November 8, 2018
Existing Permit Expiration Date: February 28, 2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2017	6.50	79.65	442.78	81.75	80.33	41.66	19.94 [Methanol (methyl alcohol)]
2016	2.78	32.79	438.39	31.17	45.51	36.12	19.13 [Methanol (methyl alcohol)]
2015	5.47	52.25	490.51	51.20	50.06	43.01	22.86 [Methanol (methyl alcohol)]
2014	5.57	55.81	443.59	54.29	51.01	39.80	20.51 [Methanol (methyl alcohol)]
2013	6.53	66.92	429.43	64.86	74.59	40.23	19.72 [Methanol (methyl alcohol)]

Review Engineer: Gautam Patnaik

Review Engineer's Signature: **Date:** xx/xx/2018

Comments / Recommendations:
Issue: 03469/T27
Permit Issue Date: xx/xx/2018
Permit Expiration Date: February 28, 2021

I. Introduction and back ground

Jordan Lumber & Supply, Co (Jordan Lumber) is located in Montgomery County. The lumber mill began operations in 1939 and produces construction grade lumber from southern yellow pine trees. The facility produces dimension lumber from green yellow southern pine logs.

The facility is categorized under North American Industrial Classification System (NAICS) code 321912 as Cut Stock, Sawmills & Planing Mills General and Standard Industrial Classification (SIC) code 2421 for Sawmills and Planing Mills. This facility is currently operating under North Carolina Department of Environmental Quality (NC DEQ) Division of Air Quality (DAQ) operating permit No. 03469T26.

The facility is classified as Title V due to PM_{10}, carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and individual total hazardous air pollutants (HAPs) emissions exceeding Title V permitting thresholds. In addition, the facility is a PSD major source for VOC emissions and for HAP emissions. The facility has accepted emission limits for PM, PM_{10}, CO, and NO_x in-order to avoid Prevention of Significant Deterioration (PSD) permitting requirements for these pollutants.

II. Existing Facility Description

The facility currently operates five steam-heated batch lumber kilns (ID Nos. K-3 through K-6 and K-8), two direct-fired batch lumber kilns (ID Nos. K-1and K-2), one continuous direct-fired kiln (CDK, ID No. K-7) and one natural gas-fired boiler (ID No. B05). The steam-heated kilns receive steam from four Wood-fired boilers (ID Nos. B01 through B04).

III. Purpose of Application

The facility is proposing to convert Kiln 6 (K-6) from a batch steam kiln to a continuous steam kiln accessing steam from the common steam header for the existing five boilers. Kiln 6 has a current design throughput of 45 million board feet per year (mmbf/yr). The conversion to a continuous kiln will allow for a design throughput of 93 million board feet per year (mmbf [1]/yr). The design steam heat input capacity of the kiln will not change as less steam is needed per unit of production due to the higher thermal efficiency of the continuous kiln.

This change in the operation of Kiln #6 from batch steam kiln operation to continuous steam kiln operation will result in an emission increase of 144 ton per year VOCs from the kiln.

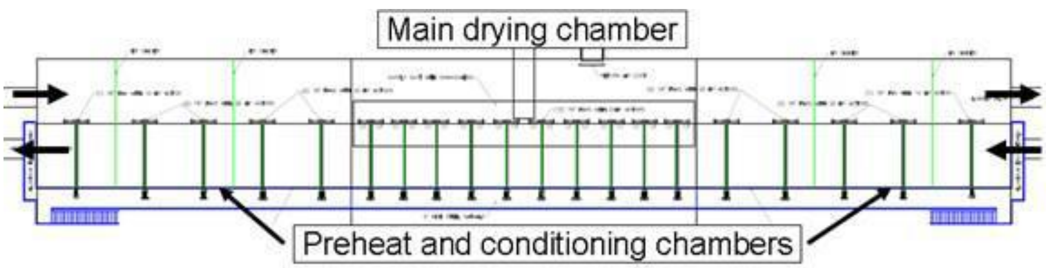
Because the proposed project will be a major modification to a major source of certain criteria air pollutants, the applicant is applying to the North Carolina Division of Air Quality (NC DAQ) for a Prevention of Significant Deterioration (PSD) construction permit.
This conversion includes steam coil replacement but keeping the piping, traps and valve arrangement as is for the center reheat coils. A new moisture monitoring and control system will be installed like currently on the continuous lumber kiln (K-7).

[1] Please note the nomenclature - Mbf or mbf = thousand board feet & MMbf or mmbf = Million of board feet.
A board foot is actually a measure of volume. By definition, a board foot is one square foot, one inch thick.
Board Footage = width in inches x length in feet x thickness in inches/12 OR width in inches x length in inches x thickness in inches/144.

IV. Continuous Kiln

"[2]Typically, lumber yard managers have had two choices when purchasing lumber drying equipment: direct-fired kilns and steam-heated dry kilns. Both choices present unique problems associated with costs and drying effectiveness. Because of the ash and soot they produce, ordinary direct-fired kilns often discolor the lumber during drying, which significantly reduces its value. There is also danger of explosion or fire due to the soot and ash which enter the kiln with the heating air. But direct-fired kilns are generally very cost effective because they use wood residue as fuel. Steam-heated dry kilns produce cleaner wood than direct-fired kilns, but the day-to-day operating costs are significantly higher. And over time the steam tubes and joints wear out which leads to high replacement costs. Day-to-day operating costs are also much higher compared to direct-fired kilns"

Continuous lumber drying kilns are an emerging technology that significantly improves productivity, lumber grade, and energy efficiency as compared to the operation of conventional batch-fed kilns. The continuous kilns differ from batch kilns in that they have preheat/conditioning chambers on both ends of the main drying chamber and a pusher system, operated by programmable logic controllers (PLCs), to advance the lumber through the kiln. These additional chambers are constructed on each end of the kiln heating chamber and a pusher system on each end conveys a continuous feed of lumber on one track into the kiln and on a second track in the opposite direction out of the kiln. The heat from the dried lumber coming out of the kiln preheats the green lumber entering the kiln on the second track, resulting in additional efficiency gains.



The proposed continuous drying kilns (CDK) chamber has a reverse flow double track design and incorporates preheating, drying, saturated cooling and equalizing phases all in one extended chamber. The CDK will consist of two tracks traveling in opposite directions and three chambers designed to provide and control the environmental conditions of heat, relative humidity, and air circulation necessary for the proper drying of wood. The lumber stacks traverse through the kiln in opposite directions on the two tracks. The lumber is automatically advanced, based on the moisture content of the lumber in the central main drying zone by stack pusher units. The advancement of the lumber into the zones and speed is automatically controlled by software.

In the first chamber or pre-heat zone the incoming green lumber is pre heated using the heat coming off the dry lumber while providing added moisture and saturated cooling for the dried lumber. The moisture conditioning reduces stress and results in a more uniform moisture distribution in the dry lumber.

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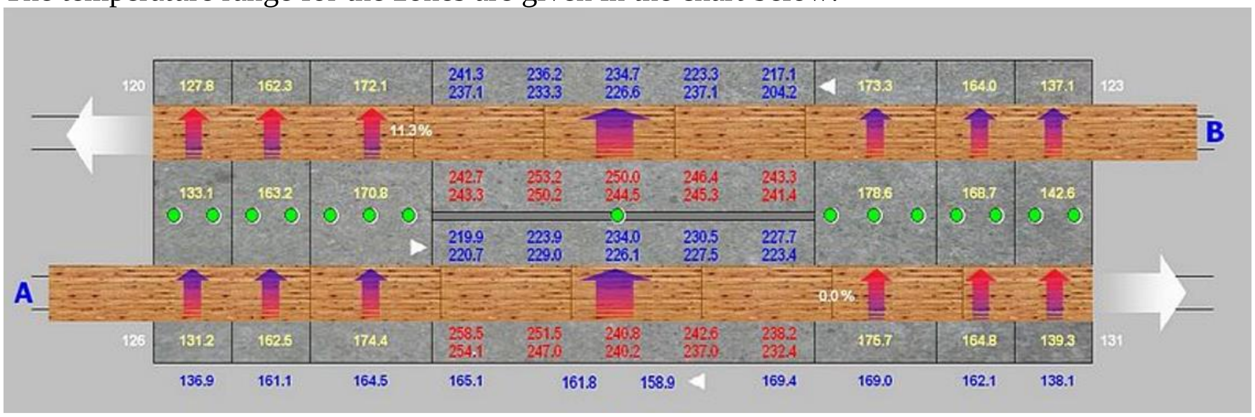
[2] http://www.energyonlineexpo.com/slinkimages/58/millwide_insider_january_2009.pdf

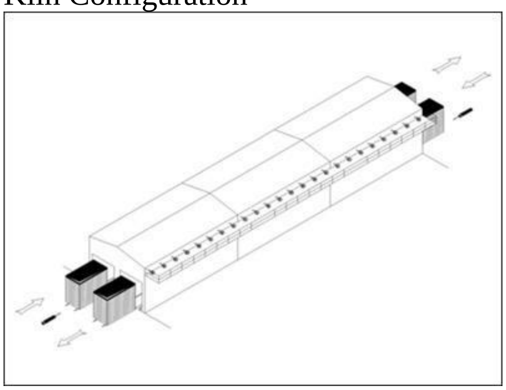
In the middle chamber (main drying zone), heat from the steam coils (highest temperature zone) will be introduced to dry the lumber.

The end zone (or conditioning zone) conditions the dried wood while preheating the incoming green lumber.

The temperature range for the zones are given in the chart below:



Kiln Configuration



Typical End Chamber

The operation is continuous and does not shut down except for unplanned malfunction events or planned maintenance outages. The continuous operating features result in improved energy efficiency and productivity of the lumber drying process. The moisture that is driven off of the green lumber conditions the dried lumber exiting the kiln main drying zone resulting in improved product quality.

The main drying zone has a design temperature range of 223 to 246 degrees Fahrenheit and the exit temperature of the kiln is variable based on ambient temperature and other factors. The average rate of travel of the lumber inside the kilns and the average total time spend inside the kiln is variable depending on outside temperature and various other factors. The facility desires a lumber moisture content of 15% by weight of finished product at the exit end of the kiln.

The total length of the new kiln is expected to be 105 feet and is expected to dry only Southern yellow pine lumber and the annual design drying capacity of the kiln is 89 million board feet per year (mmbf/yr) while drying 2” thick lumber and 55 million board feet per year (mmbf/yr) while drying 4” thick lumber. The average holding capacity is 515 ([3]mmbf) for both 2” and 4” thick lumber. The total residence time varies from 50 hours to 80 hours when drying 2” thick lumber to drying 4” thick lumber, respectively. The maximum steam coil heating capacity is 23 million Btu per hour (mmBtu/hr).

The rate of lumber advancement and the circulating air volume in the chambers of a CDK system impacts directly on the exiting air temperature at the open ends of the CDK. Higher speed than optimum will raise the exiting air temperature. Insufficient air flow in the zones will not allow sufficient heat transfer between the hot dry lumber and the cold green lumber.

For safety and quality control reasons the controlling of the CDK lumber advance speed, selecting a fan and motor configuration to ensure effective heat transfer, monitoring the exiting temperature at the end zones open doorways and activating alarm and safety procedures should a dangerously high temperature situation arise, are very crucial for the operation.

Traditional batch lumber kilns are generally equipped with 10 or higher equidistant individual roof vents following the ridge of the roof. An equal number of vents are located on each side of the kiln roof, and each set of vents reacts in unison during the kiln drying cycle. At any given time, one set of vents allows moisture to exhaust from the kiln while the other set of vents allows dry make-up air to enter from the atmosphere.

A natural draft through the exhaust vents is required to minimize spontaneous condensation of the water vapor inside the kilns and significantly reduce process-related water emissions. Since the continuous kiln is not closed on the ends, less exhaust gases leak through the kiln structure than in a batch kiln (as the internal environment is at a lower pressure), with more exhaust gases exiting out the ends of the kiln. The continuous kiln entry and exit openings must remain open to facilitate the continuous nature of the process.

Much of the heat that is lost between batches in a traditional kiln when the doors open is retained within a continuous kiln. Since there is no downtime between batches, the continuous kiln remains at operating temperatures, which results in significant energy savings.

Within the kiln, lumber will automatically advance based on its moisture content in the central heating zone where the wet bulb temperature is considerably less than the dry bulb temperature (low relative humidity). As the wood enters the end section, the wet-bulb temperature is expected to rapidly climb from ambient to approximately 50% of the differential in wet bulb between ambient and the central chamber. As the lumber exits, it reaches a point where the dry wood temperature drops below the wet bulb temperature, causing it to “rain” in the kiln. This “rain” effect conditions the wood. Gases exhaust through the open exit doors at both ends of the kiln and through roof vents. Roof vents are generally used to expedite cooling of the kilns during a shutdown or malfunction. In addition, the vents may be used for intake air during lumber drying. The vents will not discharge emissions during the active lumber drying process. The emissions coming from the kiln vents during this cool down process will be much lower than those coming from the kiln doors during the active drying process.

[3] Based on production at 8,400 hours operation per year.

V. Regulatory Summary:

The following sources are part of the conversion of the batch kiln to continuous kiln project:

Three wood-fired boilers without flyash reinjection (ID Nos. B01 through B03) with associated multicyclones (ID Nos. C01, C02, and C03) one per boiler, with the multicyclones (ID Nos. C01 and C02) connected in series to electrostatic precipitators (ID Nos. ESP-1 and ESP-2, respectively, one multicyclone with one precipitator, each) and the multicyclone (ID No. C03) connected in series with electrostatic precipitator (ID Nos. ESP-2, respectively);

One wood-fired boiler without flyash reinjection (ID No. B04) with associated multicyclones (ID Nos. C06A and C06B) in series. Multicyclones (ID Nos. C06A and C06B) connected in series with electrostatic precipitator (ID Nos. ESP-2, respectively);

One natural gas-fired boiler (ID No. B05);

Two planers (ID Nos. P01 and Po2) And

One indirect steam-heated continuous double track lumber kiln (K-6), 23.0 million Btu per hour maximum heat input rate; total potential operating rate of 93 million board feet per year (mmbf/yr).

The following discussion pertains to the Federal and State regulatory requirements that are applicable to the above sources:

1. 15A NCAC 02D .0504: "Particulates from Wood Burning Indirect Heat Exchangers"

   The wood-fired boilers are subject to the following standards for particulate matter emissions:
   i) emissions of particulate matter from the combustion of wood that are discharged from these sources (ID Nos. B01 through B03) into the atmosphere shall not exceed 0.44 pounds per million Btu heat input and
   ii) emissions of particulate matter from the combustion of wood that are discharged from this source (ID No. B04) into the atmosphere shall not exceed 0.41 pounds per million Btu heat input.

   There is no increase in the hourly boiler rating of these boilers and thus the above emissions standards remain the same. The boilers will continue to comply with the above standards and there is no change to the testing, monitoring, record keeping and reporting requirements for this regulation.

2. 15A NCAC 02D .0503: "Particulates from Fuel Burning Indirect Heat Exchangers"
   The natural gas-fired boiler (ID No. B05) is subject to this regulation and the particulate matter emissions limit is 0.45 lb/MMBtu heat input. There is no increase in the hourly boiler rating of this boiler and thus the above emissions standard remains the same. The boiler will continue to comply

with the above limit and there is no change to the testing, monitoring, record keeping and reporting requirements for this regulation.

3. 15A NCAC 02D .0516: “Sulfur Dioxide Emissions from Combustion Sources

   This standard establishes sulfur dioxide emissions limits for combustion sources. Emissions of sulfur dioxide from the boilers shall not exceed 2.3 pounds per million Btu heat input. The combustion sources will be burning only wood or natural gas since both these types of fuel have a low sulfur content and an emission rate much lower than 2.3 lbs/MMBtu, compliance will always be achieved.

4. 15A NCAC 02D .0521: “Control of Visible Emissions”

   All of the above sources are subject to a visible emissions standard of no more than 20 percent opacity when averaged over a six-minute period. The five boilers and the two planers are limited to 20 percent opacity. This project is not expected to affect compliance with this rule for existing sources and the new converted kiln.

5. 15A NCAC 02D .0524: “New Source Performance Standards (40 CFR 60, Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)”

   NSPS Subpart Dc standards apply to steam generating units with maximum design heat input capacities greater than 10 million Btu per hour (mmBtu/hr) and less than 100 mmBtu/hr. The five boilers at this facility (ID Nos. B01 through B05) are subject to this rule. These boilers are not being modified and will continue to comply with this regulation by recording the amount of wood combusted daily and the amount of natural gas combusted monthly for the respective boilers.

6. 15A NCAC 2D .0515: “Particulate from Miscellaneous Industrial Processes”

   This regulation sets a standard for particulate matter emissions from any industrial process for which no other emission control standard is applicable. This rule applies to the lumber kilns. The particulate standard is based on a process weight equation. For process weight rates up to 30 tons/hr, allowable emission rates are calculated by the equation:

   $$E = 4.10(P)^{0.67}$$

   For process weight rates greater than 30 tons/hr, allowable emission rates are calculated by the equation:

   $$E = 55.0(P)^{0.11} - 40$$

   For both equations:
   E = allowable emission limit for particulate matter in lb/hr; and
   P = process weight rate in tons/hr.

As per [4]University of Tennessee, Institute of Agriculture publication (Table 3 - Log weight table and MBF conversion factors for Southern pine) for an 8" diameter log, the weight for million board feet is 14.1 tons. For the new kiln (K-6) based on 96 mmbf/yr, the hourly weight conversion based on 8760 hours of operation per year is 0.15 tons per hour. Based on this hourly processing rate, the PM allowable emissions rate is 1.15 lb/hr.

The hourly emissions of PM based on 8760 hours of operation per year is 0.23 lbs/hour. Since the allowable rate is higher than the emissions rate, the new kiln will be always in compliance with this regulation.

7. 15A NCAC 02D .1109: "112(j) Case-by-Case Maximum Achievable Control Technology"

   Currently the boilers (ID Nos. B01 through B04) are subject to the above regulation. This project will not cause any changes to the emission limits, testing, notifications, monitoring and reporting requirements. This rule is effective until May 19, 2019.

8. 15A NCAC 02D .1111: "Maximum Achievable Control Technology Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters"

   This rule establishes emissions limit and work practice standards for HAP emissions from the five boilers at this facility (ID Nos. B01 through B05). The regulatory requirements are incorporated into the current permit. This project will not cause any changes to the emission limits, testing, notifications, monitoring and reporting requirements. This rule will be effective starting May 20, 2019 and will replace the 15A NCAC 02D. .1109 "112(j) regulation.

9. 15A NCAC 02D .1100: "Control of Toxic Air Pollutants"
   During the processing of Application (6200015.15A and 6200015.15B) for which Air Permit 03469T23 which was issued on 03/07/2016, the facility requested that the modeled emission rates be removed from the permit as allowed per 15A NCAC 02Q .0702(a)(27). The DAQ reviewed the modeled emission limits to ensure that their removal resulted in no unacceptable risk to human health. The results of the modeling conducted in 2005 are provided in the table below.

TAP	Averaging Period	% of the AAL
Acrolein	1-hour	12%
Arsenic	Annual	99%
Benzene	Annual	38%
Cadmium	Annual	1%
Formaldehyde	1-hour	30%
Hexachlorodibenzo-p-dioxin	Annual	26%
Hydrogen Chloride	1-hour	1%
Phenol	1-hour	3%
Notes: · Potential emissions used in modeling were based on the capacity of each kiln operating at 8760 hours per year.		

[4] https://extension.tennessee.edu/publications/documents/sp748.pdf-(Table 3 - Log weight table and MBF conversion factors for Southern pine)

· The arsenic AAL has been modified since the 2005 air modeling. The value in this table was based on an arsenic AAL 2.3E-7 mg/m^3. The current AAL for arsenic is 2.1E-6 mg/m^3.

In the review of Applications 6200015.15A and 6200015.15B, the potential emissions modeled concentrations for all TAPs were well below their acceptable ambient levels (AALs), with the exception of arsenic. Emissions of arsenic resulted in air concentrations at approximately 99 percent of the AAL. However, the arsenic AAL has been revised since the 2005 air modeling. The previous AAL for arsenic was 2.3E-7 mg/m^3, and it has since been increased to 2.1E-6 mg/m^3. With this change in the AAL concentration, the modeled emissions are approximately 11 percent of the revised AAL for arsenic. Given the margin of compliance with the AAL for all TAPs modeled, removal of the air toxics limits poses no unnecessary risk to human health. Thus, these limits will be removed under this permit renewal.

Since then, the permit for this facility has been modified as stated below:

- Application (6200015.16A, for Permit 03469T24, Issued on 08/31/2016)

  Purpose: Convert a steam-heated batch lumber drying kiln (ID No. K-7) to a direct, natural gas-fired continuous lumber drying kiln.

- Application (6200015.17A, for Permit 03469T25, issued on 10/23/2017)

  Purpose: Add a wood-fired gasification system on kiln 7 (ID No. K-7), which allowed the kiln to function as a direct, wood-fired gasification, continuous lumber drying kiln. The modification, allowed kiln 7 to operate as either a direct, natural gas-fired kiln or a direct, gasified wood-fired kiln.

- Application (6200015.18B, for Permit 03469T26, issued on November 8, 2018)

  Purpose: The facility added two electrostatic precipitators (ESPs, (ESP-1 and ESP-2) to the four wood-fired boilers (ID Nos. B01 through B04).

The addition of these ESPs to the boilers resulted in a decrease of particulate matter and did not increase any toxics air emissions.

The table below shows the cumulative effect of the modification of kilns K-6 (current project) and K-7

Facility-Wide TAP Emissions after Modification of K-6 and K-7								
TAP	**Facility-Wide Potential Emissions (before modification)**		**Net Emissions Change from K-7 and K-6 Modifications**	**Total Emissions**		**TPER**		**Exceed TPER?**
	(lb/yr)	**(lb/hr)**	**(lb/hr)**	**(lb/hr)**	**(lb/day)**	**(lb/hr)**	**(lb/day)**	
Acetaldehyde	12,630.00	1.44	3.67E-01	1.81E+00		6.8		N
Acrolein	3,646.00	0.42	**1.05E-03**	4.17E-01		0.02		Y
Ammonia	570.00	0.07	7.53E-02	1.40E-01	--	0.68		N
Formaldehyde	11,817.00	1.35	**5.13E-01**	1.86E+00	--	0.04		Y
Hexane, n-	320.00	0.04	4.24E-02	7.89E-02	1.89E+00		23	N
Phenol	2,382.00	0.27	**1.23E-01**	3.95E-01	--	0.24		Y

The emissions of toxics that exceed the TPER are acrolein, formaldehyde and phenol.

The table below shows the 2005 modeled emissions rates and the emissions increase modification of kilns K-6 (current project) and K-7

TAP	2005 Modeling Results		Total Emissions after modification (Facility-wide Actual + Potential) (lb/hr)
	Total Modeled Emissions	% of the AAL	
Formaldehyde	2.172 (lb/hr)	30%	1.8 (lb/hr)
Phenol	1.131(lb/hr)	3%	0.30 (lb/hr)
[a]Acrolein	10.5 lbs/day	12%	0.4 (lb/hr)

[a]The acrolein modeling rates (10.5 lbs/day & 3,826 lbs/yr) were based on April 6, 2005 letter to Mr. Steven Vozzo, in the attached Facility Wide Emissions Summary Form D1, in a memo from Tom Anderson to Steve Proctor Dated September 21, 2005. For one hour averaging the % impact to the AAL of NAQS was 12%

Based on the increase in emissions of TAPs due to the modification of kilns K-6 (current project) and K-7 the effect on the AAL is going to be minimal and it will not cause any health risk by this modification.

10. 15A NCAC 2D .0614: “Compliance Assurance Monitoring (CAM) Rule”

The CAM Rule (40 CFR Part 64) applies to pollutant-specific emissions units (PSEU) that are pre-control major sources and use a control device to comply with an emissions limit. For the CAM Rule to apply to a specific emission unit/pollutant, the following four criteria must be met:

1. The emission unit must be located at a major source for which a Part 70 or Part 71 permit is required.
2. The emission unit must be subject to an emission limitation or standard.
3. The emission unit must use a control device to achieve compliance with the emission limitation or standard.
4. The emission unit must have potential, pre-controlled emissions of the pollutant of at least 100 percent of the major source threshold.
5. *Control device means equipment,* ***other than inherent process equipment****, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere. The types of equipment that may commonly be used as control devices include, but are not limited to, fabric filters, mechanical collectors, electrostatic precipitators, …*

The kiln K-6 does not have any control devices and are thus exempt from CAM requirements.

11. 15A NCAC 02D .0530: "Prevention of Significant Deterioration"

Congress first established the New Source Review (NSR) program as part of the 1977 Clean Air Act Amendments and modified the program in the 1990 Amendments. The NSR program requires pre-construction review prior to obtaining a permit. The basic goal of NSR is to ensure that the air quality in clean (i.e. attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The NSR regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. PSD permits are a type of NSR permitting requirement for new major sources or sources making a major modification in an attainment area.

Under PSD requirements, all major new or modified stationary sources of air pollutants as defined in Section 169 of the Federal Clean Air Act (CAA) must be reviewed and permitted prior to construction by EPA or permitting authority, as applicable, in accordance with Section 165 of CAA. A "major stationary source" is defined as any one of 28 named source categories, which emits or has a potential to emit 100 tons per year of any "regulated NSR pollutant" or any other stationary source, which emits or has the potential to emit 250 tons per year of any PSD regulated pollutant.

Pursuant to the Federal Register notice on February 23, 1982, North Carolina (NC) has full authority from the EPA to implement the PSD regulations in the State effective May 25, 1982. NC's State Implementation Plan (SIP)-approved PSD regulations have been codified in 15A NCAC 2D .0530, which implement the requirements of 40 CFR 51.166. The Code of Federal Regulations (CFR) in 15A NCAC 2D .0530 are incorporated by reference unless a specific reference states otherwise. The version of the CFR incorporated in 15A NCAC 2D .0530 is that as of November 7, 2003, except those provisions noticed as stayed in 69 FR 40274, and does not include any subsequent amendments or editions to the referenced material. The PSD regulations applicable to this project are the regulations in 15A NCAC 2D .0530 in effect as of the final permit issuance date. The latest revisions to 15A NCAC 2D .0530 became effective on July 28, 2006.

Operations at this facility are categorized under Standard Industrial Classification (SIC) code 2421 for sawmills and planing mills. The raw material for dimensional lumber, the principle product, is southern pine logs.

The PSD regulations apply to major modifications at major stationary sources, which are considered to be those sources belonging to any one of the 28 source categories listed in the regulations that has the potential to emit more than 100 tons per year of any PSD-regulated compound, or any other source which has the potential to emit more than 250 tons per year of any PSD compound. This facility is currently classified as a major stationary source under Prevention of Significant Deterioration (PSD) regulations. Lumber mill facilities do not belong to one of the 28 listed categories. This facility does emit greater than 250 tons per year of a PSD-regulated air compound (VOC, actual emissions of VOC in 2017 was 442.78 tpy) and is therefore an existing major source under Prevention of Significant Deterioration (PSD) permitting program, as provided the North Carolina Administrative Code Title 15A, Sub-Chapter 02D, Section .0530 (15A NCAC 02D .0530).

A PSD applicability analysis was performed for the proposed project to determine if any regulated compounds would be subject to PSD review. The facility did a project analysis for the emissions of PM, PM_{10}, $PM_{2.5}$, CO, SO_2, NO_x, Lead, VOCs and CO_{2e}.

- The continuous lumber drying kiln:

  Kiln 6 (K-6) will be converted from a batch steam kiln with a design throughput of 45 million board feet per year (mmbf/yr) to a continuous double track indirect steam-heated kiln with a design throughput of 93 million board feet per year (mmbf/yr). The required steam will be accessed from the common steam header for the existing five boilers. As per the applicant "the design steam heat input capacity of the kiln will not change as less steam is needed per unit of production due to the higher thermal efficiency of the continuous kiln." However, the steam heat supply capacity will be maintained at the current level of 23 million Btu/hr.

  The facility plans to shift production from the other existing batch kilns to the new continuous kiln primarily to improve product quality, which is achieved through the more carefully controlled drying conditions of the continuous kiln. There is no net increase in annual lumber production from the facility.

  The emissions increases are calculated directly related to the conversion of Kiln 6 (K-6) from a batch steam kiln to a continuous kiln. The decrease in emissions from decrease in production with other kilns were not taken into account.

The facility used a variety of emission factors including factors from National Council for Air and Stream Improvement (NCASI) and US EPA AP-42. For all the above changes and the factors affecting major sources are listed below:

- North Carolina Division of Air Quality Emission (NCDAQ) Emissions Estimation Spreadsheets;

- U.S. Environmental Protection Agency (EPA) publications

- AP-42 Compilation of Air Emission Factors (5th Edition, Revised);
  Emission factors from U.S. EPA's AP-42 document (5th edition unless otherwise noted) were relied upon to calculate emissions from the boilers for wood and natural gas combustion. The following AP-42 sections were utilized:
  - Section 1.4, Natural Gas Combustion;
  - Section 1.6, Wood Residue Combustion in Boilers;

  Additionally, filterable PM from the wood-fired boilers corresponds to the 40 CFR § 63 Subpart DDDDD (Boiler NESHAP) limit and the condensable PM emission factor comes from AP-42 Section 1.6 for wood combustion in the projected actual evaluation. To be conservative, the calculations assumed that all the emissions of particulate matter were the same as PM_{10} and $PM_{2.5}$.

- 40 CFR 63 Subpart DDDDD;

- Stack test data or Other Site-Specific Emission Factors; and

  The CO emission factor for boilers (ID Nos. B01 through B03) was derived from 1998 stack test data. The PM emission factor for boilers (ID Nos. B01 through B03) in the baseline evaluation was based on identical results from testing conducted on 9/16/2014 and 11/10/1998 conducted on boilers (ID Nos. B02 and B03, respectively).

  (Note – these calculations were done before the addition of electrostatic precipitator (ESP) on boilers (ID Nos. B01 through B04), during revision of permit (03469T26, Application # 6200015.18B). The addition of the ESP will further reduce the emissions of PM, PM_{10} and $PM_{2.5}$, and still will not cause the emissions of PM, PM_{10} and $PM_{2.5}$ to be subject to PSD).

  The PM emission factor for the two planar/hog wood waste collection systems are based on engineering estimates from site-specific data.

- U.S. EPA's Mandatory Greenhouse Gas Reporting Regulation (40 CFR 98).

  The U.S. EPA Mandatory Greenhouse Gas (GHG) reporting rule emission factors and global warming potentials from Subparts A (General Provision) and C (General Stationary Fuel Combustion Sources) and tables "Table C-1 to Subpart C of Part 98 - Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel" and "Table C-2 to Subpart C of Part 98 - Default Ch_4 and N_2O Emission Factors for Various Types of Fuel" were used to calculate emissions from carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from wood combustion.

<u>Baseline Emissions</u>

Baseline emissions is defined in 40 CFR §51.166(b)(21)(ii) as "actual emissions as of a particular date shall equal the average rate, in tons per year, at which the unit actually emitted the pollutant during a consecutive 24-month period which precedes the particular date and which is representative of normal source operation. The reviewing authority shall allow the use of a different time period upon a determination that it is more representative of normal source operation. Actual emissions shall be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored, or combusted during the selected time period."

For this project, two years of production data (2014 to 2015) was selected as the baseline period. The baseline represents the average annual emissions during this baseline in tons per year for the existing sources.

The tons per year of dry and wet woods used for the wood-fired boilers (B01 through B04) and the total million Btu/yr for the natural gas-fired boiler (B05) during the baseline years (2014 to 2015) are given below:

ID Nos.	Emission Source Description	2014	2015	[t]Wood type
B01, B02 and B03	Three boilers, wood/bark-fire	607	591	(dry wood) tpy
		6,186	5,345	(wet wood) tpy
B04	One wood-fired boiler with a stoker-type burner	202	197	(dry wood) tpy
		2,062	1,782	(wet wood) tpy
B05	One natural gas-fired boiler	21,468	12,255	million Btu/yr

[t]Dry woods are wood that have undergone some drying process like in a kiln. The Wet woods are wood that have not gone through any drying process.

The table below shows the percentages calculated as the heat input values (million Btu) used in Kiln 6 divided by the total heat input values (million Btu) of all the steam boilers for the past several years including the baseline years.

Year:	2014	2015	2016	2017
Kiln 6 Fuel Usage Ratio:	22.34%	16.36%	16.03%	15.78%

The tons per year emissions of PM, PM_{10} and $PM_{2.5}$ for the boilers, Kiln 6 and other PM sources during the baseline years (2014 to 2015) are given below:

ID Nos.	Emission Source Description	PM		PM10		PM2.5	
		2014	2015	2014	2015	2014	2015
[1,6]B01, B02 and B03	Three boilers, wood/bark-fired	10.32	9.09	9.42	8.29	5.86	5.16
[3,5]K-6	Indirect steam-heated lumber kiln	0.36	0.27	0.36	0.27	0.36	0.27
[5]P01 and P02	Two hog/planer wood waste collection systems	0.05	0.13	0.05	0.13	0.05	0.13
[1]B04	One wood-fired boiler with a stoker-type burner	2.94	2.59	2.69	2.37	1.68	1.48
[5]B05	One natural gas-fired boiler	0.12	0.05	8.94E-02	4.09E-02	1.68	1.48
Total (tpy)		**13.79**	**12.14**	**12.61**	**11.10**	**7.99**	**7.06**

[1]Total PM is the sum of total filterable PM from source testing plus condensable PM factor of 0.017 lb/MM Btu from AP-42 (Table 1.6-1).
[2]Uncontrolled small boilers (<100 MMBtu/hr), AP-42, Section 1.4.
[3]NCASI indirect fired kiln test data for Pineland sawmill.
[4]Baseline is 2014-2015.
[5]Assumes TSP=PM10=PM2.5 for the lumber kilns and waste collection systems.
[6]B01, B02, B03 emission factor for PM based on identical results from testing conducted on 9/16/2014 and 11/10/1998 conducted on Boilers 2 and 3, respectively.
Speciation based on AP-42 for wood-fired boiler equipped with cyclone.

VOC emissions during the baseline years are given below:

ID Nos.	Emission Source Description	Emission Factor		Production Data		Units	Emission Rate (tons/yr)		BAE (tons/yr)
				2014	2015		2014	2015	--------
[1]B01, B02 and B03	Three boilers, wood/bark-fired 1, 5	????	lb/MMBtu	607	591	TPY (dry wood)	0.08	0.08	--------
		0.017	lb/MMBtu	6,186	5,345	TPY (wet wood)	0.47	0.41	--------
[3]K-6	Indirect steam-heated lumber kiln3	4.09	lb/1000 BDFT	33,120	24,674	MBF/yr	67.73	50.46	--------
[1]B04	One wood-fired boiler with a stoker-type burner 1, 5	0.017	lb/MMBtu	202	197	TPY (dry wood)	0.03	0.03	--------
		0.017	lb/MMBtu	2,062	1,782	TPY (wet wood)	0.16	0.14	--------
[2]B05	One natural gas-fired boiler 2, 5	5.39E-03	lb/MMBtu	21,468	12,255	MMBtu/yr	0.06	0.03	---------
Totals							**68.53**	**51.14**	**59.84[4]**

[1]Wood residue combustion in boilers, AP-42 (Section 1.6).
[2]Uncontrolled small boilers (<100 MMBtu/hr), AP-42 (Section 1.4).
[3]Softwood VOC and toxics emission factors are from Wallace Pitts (DAQ-RCO) analysis of NCASI/EPA data (see full spreadsheet on DAQ website for factor documentation).
[4] BAE calculation [(68.53 tpy + 51.14) ÷ 2 = 59.84 tpy]

PSD Applicability Test Methodology

To test for PSD applicability two different test Methodologies were used.

The analysis was performed by comparing baseline actual emissions to potential emissions under 40 CFR §51.166 (a)(7)(iv)(d) and NCAC 2D .0530 to determine the emissions increase due to the proposed project. For this project, years 2014 and 2015 were selected as the baseline period. The PSD applicability calculations used the actual throughput rates for the baseline period and actual emission factors to calculate the baseline actual emissions.

To calculate post project potential emissions, the post-project capacity of 96 million board feet per year was used for the kiln K-6 emission increases. Additionally, the projected throughput of the Planar Waste Collection system totaled the new capacity of the Kiln K-6.

As per the applicant "The batch kilns will continue to have the same capacity after the project; however, because the purpose of switching to continuous kilns is improved product quality, the facility is preferentially going to make more product with the continuous kilns (K-6 and K-7) located at the site. Many lumber facilities in North Carolina have been making this transition and some have even completely eliminated batch kilns at their sites (e.g., West Fraser) as lumber mills have been steadily transitioning to this superior method of production."

The "project emissions increases" have been calculated using the prescribed baseline actual to potential emissions calculation methodology for the affected Kiln #6. Because there is a net increase in capacity of Kiln #6 and ***the facility did not take credit for reduced production in the other kilns***. The capacity of other kilns at this facility will remain at the following levels as per the table below:

K-1	694,400	BDFT/week	(steam-heated)
K-2	822,000	BDFT/week	(continuous direct fired)
K-3	332,800	BDFT/week	(steam-heated)
K-4	347,200	BDFT/week	(steam-heated)
K-5	1,785,000	BDFT/week	(steam-heated)
K-7	1,295,000	BDFT/week	(continuous direct fired)

The applicant also used the "actual-to-projected-actual applicability test" for projects that only involve existing emissions units, as per 40 CFR §51.166 (a)(7)(iv)(c). The emissions increase resulting from a proposed project for affected existing sources were calculated using a "prorated approach" of the utilization of each boiler using years 2016 and 2017 to represent projected utilization in the future.

All of the boilers collectively operate to provide steam to a common header supplying steam to the kilns. The four wood-fired boilers (B01- Through B04) have each a capacity of 26.8 million Btu per hour maximum heat input and one natural gas-fired boiler rated at 31.5 million Btu per hour maximum heat input.

As shown by a comparison of 2017 and 2016 statistics below, Boilers 1 through 3 have approximately 60% heat input and Boilers 4 and 5 approximately 20% heat input. The relative usage of each of these boilers was identical during these two years and as per the applicant "it is believed using a prorated approach of the utilization of each boiler is a fair way to represent potential utilization in the future."

The heat input capacity of K-6 was not changed as a result of this project. The kiln will continue to utilize up to 23 million Btu/hr of steam and since all of the kilns obtain steam from a common header, the amount of fuel combusted in the boilers to supply steam to K-6 was **estimated** using the maximum heat input capacity of the kiln and ***throughputs through individual boilers was prorated using a weighted heat input capacity that occurred in 2017***.

2016 Fuel Use:

Boiler	Fuel	Throughput	Heat Input (million Btu/yr)	% Heat Input	% by Fuel Type	
B01-B03	Dry Wood	2,835 tpy	45,360	8%		
	Wet Wood	33,630 tpy	302,670	52%		
B04	Dry Wood	945 tpy	15,120	3%		
	Wet Wood	11,210 tpy	100,890	17%	79%	wood
B05	Natural Gas	120.7 MMScf/year	123,121	21%	21%	natural gas
Total (B01-B05)			587,161			

2017 Fuel Use:

Boiler	Fuel	Throughput	Heat Input (million Btu/yr)	% Heat Input	% by Fuel Type	
B01-B03	Dry Wood	2,550 tpy	40,800	8%		
	Wet Wood	29,940 tpy	269,460	51%		
B04	Dry Wood	850 tpy	13,600	3%		
	Wet Wood	9,980 tpy	89,820	17%	79%	Wood
B05	Natural Gas	108.0 MMScf/year	110,209	21%	21%	Natural Gas
Total (B01-B05)			523,889			

The applicant used potential emissions (for the kiln K-6) and projected emissions (all boilers B01 through B05) to determine PSD applicability this is valid per 40 CFR §51.166 (a)(7)(iv)(f) "*hybrid test for projects*" that involve multiple types of emissions units using potential and projected emissions.

Based on the above boiler heat input estimation and the design capacity of the kiln the emissions of PM, PM_{10} and $PM_{2.5}$ for the boilers, Kiln 6 and other PM sources are given below:

ID Nos.	Emission Source Description	PM	PM_{10}	$PM_{2.5}$
B01, B02 and B03	Three boilers, wood/bark-fired (dry wood)	1.84	1.69	1.15
	Three boilers, wood/bark-fired (wet wood)	12.13	11.25	7.71
B04	One wood-fired boiler with a stoker-type burner (dry wood)	0.91	0.83	0.54
	One wood-fired boiler with a stoker-type burner (wet wood)	6.03	5.56	3.65
P01 and P02	Two hog/planer wood waste collection systems	5.44E-04	5.44E-04	5.44E-04
B05	One natural gas-fired boiler	1.25E-02	1.25E-02	1.03E-02
K-6	Indirect steam-heated lumber kiln	1.02	1.02	1.02
Total (tpy)		22.0	20.0	14.0

[1] Weighted PM emission factors for emission source ID Nos. B01, B02, B03 and B04 using the baseline actual emission factor for 200 days/year (11/1 - 5/19) and NESHAP emission factor of 0.037 lb/MMBtu (filterable) + 0.017 lb/MMBtu (condensable) for 165 days/year (5/20-11/30).
[2] Uncontrolled small boilers (<100 MMBtu/hr), AP-42, Section 1.4.
[3] NCASI indirect fired kiln test data for Pineland sawmill.
[4] Particulate Matter emission factor for the two planar/hog wood waste collection systems are based off of engineering estimates from site-specific data. Assumes 99.9% control efficiency from baghouse.

Project VOC Emissions:

ID Nos.	Emission Source Description	Emission Factor		Projected Actual Production		
				throughput	**Units**	**Emissions Rate tpy**
[1]B01, B02 and B03	Three boilers, wood/bark-fired		lb/MMBtu	1,354	TPY (dry wood)	0.18
		0.017	lb/MMBtu	15,896	TPY (wet wood)	1.22
[1]B04	One wood-fired boiler with a stoker-type burner	0.017	lb/MMBtu	202	TPY (dry wood)	0.06
		0.017	lb/MMBtu	2,062	TPY (wet wood)	0.41
[2]B05	One natural gas-fired boiler	5.39E-03	lb/MMBtu	21,468	MMBtu/yr	0.13
[3]K-6	Indirect steam-heated lumber kiln	4.09	lb/1000 BDFT	33,120	MBF/yr	201.81
Totals						**203.81**

[1]Wood residue combustion in boilers, AP-42 (Section 1.6).
[2]Uncontrolled small boilers (<100 MMBtu/hr), AP-42 (Section 1.4).
[3]Softwood VOC and toxics emission factors are from Wallace Pitts (DAQ-RCO) analysis of NCASI/EPA data (see full spreadsheet on DAQ website for factor documentation).

The table below shows the emission during baseline years “Baseline Actual Emissions” (BAE), the Project Actual Emissions (PAE) which includes the potential emissions for the kiln K-6 and the planar waste collection system and the projected heat input capacity of all boilers based on heat input capacity that occurred in 2017 and the “Total Project Emission Increases” based on (PAE-BAE):

Pollutants	SO_2	PM	PM_{10}	$PM_{2.5}$	NO_x	CO	Pb	VOC	CO_{2e}
Project Emission Increases									
Baseline Actual Emissions (BAE)	1.03	12.97	11.86	7.53	11.57	9.64	1.97E-03	59.84	Not available (Assumed zero)
Project Actual Emissions (PAE)	2.76	21.95	20.36	14.10	30.46	25.99	5.28E-03	203.81	12,767
Total Project Emission Increases (PAE-BAE)	1.73	8.98	8.51	6.57	18.89	16.35	3.31E-03	143.97 *	12,767
PSD Significant Emission Rates	40	25	15	10	40	100	0.6	40	75,000
Major PSD Review Required	NO	NO	NO	NO	NO	NO	NO	YES	NO

* Significance Level Calculation (PAE-BAE): [203.81 tpy – 59.84 tpy = 143.97 tpy]

The net emissions increases are less than the significant emissions rate of each regulated NSR pollutants, except VOC emissions. Because the facility is major, each pollutant with a "potential to emit" increase greater than the "significance" level is subject to PSD regulations and must meet certain review requirements. As noted above, VOC emissions exceed the PSD significance level and are, therefore, subject to PSD. The following reviews and analyses are required for PSD review for significant VOC increases:

1) A Best Available Control Technology (BACT) Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),
2) An Air Quality Impacts Analysis was included as part of the application. VOC impacts are determined through regional scale modeling and regulated under North Carolina’s State Implementation Plan and
3) An Additional Impacts Analysis including effects on soils and vegetation, and impacts on visibility in accordance with 40 CFR 51.166(o).

<u>15A NCAC 2D .0530(u)</u>

The project used **projected actual emissions from the boilers (B01 through B05)** and per the requirements of this regulation [2D .0530(u)], the applicant is required to record and track the project based emissions for a period of 10 years.

The table below shows the projected emissions of PM, PM_{10} and $PM_{2.5}$ from all boilers.

ID Nos.	**Emission Source Description**	**PM**	**PM_{10}**	**$PM_{2.5}$**
B01, B02 and B03	Three boilers, wood/bark-fired (dry wood)	1.84	1.69	1.15
	Three boilers, wood/bark-fired (wet wood)	12.13	11.25	7.71
B04	One wood-fired boiler with a stoker-type burner (dry wood)	0.91	0.83	0.54
	One wood-fired boiler with a stoker-type burner (wet wood)	6.03	5.56	3.65
B05	One natural gas-fired boiler	1.25E-02	1.25E-02	1.03E-02
Total (tpy)		20.9	19.3	13.1

The emissions to track in the proposed permit are as follows:

Pollutant	**Projected Actual Emissions (Tons per Year)**
Pollutants	**Projected Actual Emissions (tpy)**
PM	20.9
PM_{10}	19.3
$PM_{2.5}$	13.1
NO_x	30.4
SO_2	2.7
CO	25.9

The projected actual emissions are not enforceable limitations. If the reported actual emissions exceed the projected actual emissions, the applicant shall include in its annual report an explanation as to why actual emissions exceeded the projected actual emissions. VOC emissions are not included in the emissions to be tracked since this project triggered VOC emissions to be subject to a BACT. (See Section 2.2 B.1, of the modified permit).

VI. Best Available Control Technology (BACT)

The change in the operation of Kiln #6 from batch steam kiln operation to continuous steam kiln operation will result in an emission increase of 144 ton per year VOCs from the kiln and are subject to BACT review due to significant increases in VOC emissions into the atmosphere.

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT, 40 § 51.166(b)(12) defines BACT as “an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each a regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of such pollutant." In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standards.

BACT's technology determination must include a consideration of numerous factors. The procedure upon which a decision should be made is not prescribed by Congress under the Clean Air Act. This void in procedure has been filled by what several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual."

As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that **particular case**. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the **degree of expected air quality impacts**."

The BACT requirements are intended to ensure that the control systems incorporated in the design of the proposed modification reflect the latest control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the facility. Given the variation between emission sources, facility configuration, local airsheds, and other case-by-case considerations, Congress determined that it was impossible to establish a single BACT determination for a particular pollutant or source. Economics, energy, and environmental impact are mandated in the CAA to be considered in the determination of case-by-case BACT for specific emission sources. The EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. The EPA Environmental Appeals Board recognizes the "top-down" approach for delegated state agencies,[5] however this procedure has never undergone rulemaking, and as such, the "top-down" process is not binding on fully approved states, including North Carolina.[6] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different, and the state must decide how to weigh each of the various BACT factors.

North Carolina is concerned that the application of EPA's DRAFT suggested "top-down" process will result in decisions that are inconsistent with the Congressional intent of PSD and BACT.

The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions:

"*The decision regarding the actual implementation of best available technology is a key one, and the **committee places this responsibility with the State**, to be determined on a case-by-*

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[5] See, http://es.epa.gov/oeca/enforcement/envappeal.html for various PSD appeals board decisions including standard for review.

[6] North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.

In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. ***The weight to be assigned to such factors is to be determined by the State****. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA's new source performance and hazardous emissions standards, which represent a floor for the State's decision.*

This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility.

If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction or limit its size. ***This is strictly a State and local decision; this legislation provides the parameters for that decision.***

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country in not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. ***For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level.*** *This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology."*

Therefore, NC DAQ does not strictly adhere to EPA's top-down guidance. Rather NC DAQ implements BACT in strict accordance with the statutory and regulatory language. As such, NC DAQ's BACT conclusions may differ from those of the applicant or U.S. EPA.

Best Available Control Technology may be defined through an emission limitation based on the maximum degree of reduction of each pollutant subject to PSD regulation, which the permitting authority, **on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility** through application of production processes and available methods, systems, and techniques.

<u>*BACT for VOC Control*</u>:

The VOC emissions from lumber kiln facilities are primarily generated as a result of drying the wood and to a lesser extent, wood combustion in the boilers to generate steam to provide the heat for drying the lumber. VOC emissions from southern yellow pine lumber kilns consist mainly of non-HAP organic compounds, primarily as alpha-pinene (α-pinene), as well as smaller quantities of other monoterpenes, such as betapinene and limonene. Other VOCs - methanol, phenol, formaldehyde, MEK, and acetaldehyde, are also emitted from the lumber during the drying process. The VOCs emitted from southern pine lumber drying consist of approximately 80-90 percent terpenes and pinenes, which are native compounds in the wood tissue. Emissions of these compounds are largely proportional to the amount of moisture removal from the lumber (e.g., the longer the lumber is dried, the higher the VOC emissions).

i) Step 1 – Identify Control Options:

The first step is to define the spectrum of process and/or add-on control alternatives potentially applicable to similar emission units. A review of the RACT/BACT/LAER Clearinghouse and a review of technologies in use at similar sources, and a review of State issued air permits was conducted for similar manufacturing facilities. The RACT/BACT/LAER Clearinghouse search provision was used to search for VOC emissions from wood lumber kilns (process type: 30.800, keywords used were continuous and direct fired) for a period from 1/1/2005 to 2/19/2015.

The following categories of technologies are addressed in identifying candidate control alternatives:

- Demonstrated add-on control technologies applied to the same emissions unit at other similar source types;
- Add-on controls not demonstrated for the source category in question but transferred from other source categories with similar emission stream characteristics;
- Process controls such as combustion or alternate production processes;
- Add-on control devices serving multiple emission units in parallel; and
- Equipment or work practices, especially for fugitive or area emission sources where add-on controls are not feasible.

Information reviewed during review indicates that add-on air emission controls are not commonly applied to lumber drying kilns (steam heated continuous or batch kilns) and that the combined characteristics of the exhaust from traditional lumber drying kilns, (as discussed above) present a number of technical obstacles to overcome if add-on controls were to be used. However, several control technologies were identified that have been used by other industries to control similar VOC species and were considered in this analysis.

These technologies are as follows:

<u>Control Options</u>:

1) Carbon adsorption;
2) Condensation;
3) Regenerative thermal or catalytic oxidation;
4) Biofiltration; and
5) Operational Practices: Work practices, such as drying to a specific lumber moisture content.

ii) Step 2 – *Eliminate Technically Infeasible Control Options and Operational Practices*:

The second step is to evaluate the technical feasibility of the control devices identified in the first step and to reject those that are technically infeasible based on an engineering evaluation or on chemical or physical principles. The following criteria were considered in determining technical feasibility: previous commercial-scale demonstrations, precedents based on issued PSD permits, State requirements for similar sources, and technology transfer. Selection of a control technology is made on the basis of stream-specific characteristics such as flow rate, hydrocarbon concentration, temperature, and moisture content.

<u>Carbon adsorption</u>

Carbon adsorption systems utilize adsorption media (typically activated carbon) to capture certain VOC species. The core component of a carbon adsorption system is an activated carbon bed contained in a steel vessel. The VOC laden gas passes through the carbon bed where the VOC is adsorbed on the activated carbon. The cleaned gas is discharged to the atmosphere. The spent carbon is regenerated either at an on-site regeneration facility or by an off-site activated carbon supplier. Spent carbon is regenerated by using steam to displace adsorbed organic compounds at high temperatures.

Over time the adsorption media will be saturated with VOCs, requiring that it be “desorbed” (remove from a surface or media on which it is adsorbed) prior to further use, although some VOCs can be desorbed by chemical treatment. The total hydrocarbons (THC)/VOC makeup is primarily composed of terpenes $(C_5H_8)n$, the primary VOC constituent in kiln drying southern yellow pine, these terpenes must be thermally desorbed to work properly.

Carbon adsorption is not recommended for exhaust streams with greater than 50% relative humidity and temperatures greater than 150 degrees Fahrenheit Carbon. At high moisture content, water molecules begin to compete with the hydrocarbon molecules for active adsorption sites. This reduces the capacity and the efficiency of the adsorption system. In addition, high exhaust temperatures reduce the efficiency of the activated carbon in capturing hydrocarbons. The exhaust from a lumber drying kiln is saturated with moisture for extended periods of the drying cycle. Exhaust temperature vary according to the drying cycle but can regularly exceed 200°F. For these reasons, carbon adsorption is not a feasible control technology

<u>Condensation</u>

Condensation requires that the exhaust stream be cooled to a temperature low enough such that the vapor pressure of the exhaust gases are lower than the VOC concentration of the exhaust gases. The primary constituent of the VOC in the exhaust gas stream from the lumber kilns is terpenes, which would require the temperature of the exhaust stream to be lowered to well below 0 °F in-order to have a low enough vapor pressure to use condensation. A temperature of 0 °F would cause the water vapor in the stream to freeze, and the resulting ice particles would clog the unit. Although no existing lumber kilns have VOC controls and all available information indicates that it would be extremely challenging to control VOC emissions from lumber kilns, condensation is not technically feasible to control VOC emissions from a lumber kilns.

<u>Bio-filtration</u>

Bio-filtration uses microorganisms to biologically degrade VOCs into carbon dioxide and water. In bio-filtration systems, the exhaust gas stream is passed through one or more beds of biomedia such as compost or beds of packing using nutrient recycle material. Since biofilters are dependent upon biological activity to destroy VOC, removal efficiencies of biofilters are widely variable. All bio-filters are extremely sensitive to a number of exhaust stream characteristics including moisture content, temperature, VOC species and concentration and bed retention time.

Bio-filtration is an efficient control for a system that provides a consistent flow of VOC, pH balanced moisture, and lower operating temperature. There does not seem to be any manufacturer data for a bio-filtration system to control the exhaust gas stream with characteristics similar to that for a lumber kilns. However, in a previous lumber kiln BACT analysis, a vendor was able to provide rough estimates of necessary exhaust “conditioning” requirements and with an estimated

VOC control efficiency. The only conditioning requirement for this system is that the kiln exhaust gas temperature must be cooled to approximately 100 degrees F to achieve a temperature suitable for the biofiltration microorganisms to work effectively, since microorganisms in biofilters that break down the VOCs generally do not thrive at temperatures more than 110 degrees Fahrenheit. The applicant expects the temperature of the kiln exhaust air to be at least 120 degrees Fahrenheit (See chart for temperature range for the zones, above).

An estimated VOC control efficiency of nearly 90 percent was quoted as being achievable during “average” VOC concentration loading, but is much lower during periods when the VOC concentration rises above the “average” concentration level[7].

National Council for Air and Stream Improvement (NCASI) does not have any specific available data on biofilter control for emissions of VOC from of lumber kilns. One would only expect approximately 60 to 70 percent VOC control because pinenes and terpenes are not well controlled by biofilters at all, but formaldehyde and methanol may be better controlled. This seems reasonable that water soluble compounds like formaldehyde and methanol will be well controlled in a biofilter (control efficiencies will be greater than 90 percent for these compounds), but based on available stack test data from the Weyerhaeuser OSB facility in Elkin, NC[8], their press biofilter only achieves 13 percent control of total VOC. Since terpenes account for the majority of the lumber kiln emissions, a major technical uncertainty about this control option is whether or not the biofilter beds would periodically plug due to buildup of the “sticky” terpenes present in the kiln exhaust. The build-up of this “sticky” material would require more frequent replacement of the filter media and higher operating costs, thus ruling this control device as technically infeasible.

Regenerative Catalytic or Thermal Oxidation

The principles utilized in both the regenerative catalytic oxidation (RCO) and regenerative thermal oxidation (RTO) of VOC are based on simple chemistry and heat transfer phenomena. Oxidation technologies have been widely accepted as the most effective technologies for VOC destruction.

Oxidation, or “combustion,” of VOC involves a chemical reaction between hydrocarbons and oxygen to form carbon dioxide and water vapor. Combustion of VOC emission streams occurs spontaneously at elevated temperatures, which are typically attained by combustion of an auxiliary fuel within the “combustion zone” of the combustion equipment. The percent conversion of VOC to carbon dioxide and water is dependent upon temperature and “residence time” of the VOC in the fuel combustion zone. Combustion of VOCs in the presence of a catalyst is referred to as “catalytic oxidation” and allows oxidation to occur at substantially lower temperatures, thereby requiring less auxiliary fuel to maintain the desired temperature. In an RCO the catalysts are typically based on a noble metal and can be contained in a fixed or fluidized bed. Despite the decreased oxidation temperature, process exhaust gas must still be preheated, typically through heat exchange or direct heating in a combustion chamber, prior to contact with the catalyst bed.

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[7] Weyerhaeuser Greenville facility BACT Analysis (Application # 7400252.05B)
[8] Testing conducted on 2009 at the Weyerhaeuser NR Company, Elkin Facility. Results summarized in Memorandum dated March 30, 2010. (Air Quality Permit No. 05678T34)

Catalytic oxidizers are very sensitive to particle contamination and can normally only be used on very "clean" exhaust streams containing little or no particulate. Not much particulate matter is expected from the indirect steam heated continuous kiln as opposed to the continuous direct fired kilns where the products of combustion (generally a sawdust burner/gasifier) are injected into the kilns. The capital cost and operations cost for a RCO are generally more than the capital cost and operations cost of a RTO for the same operational unit.

Regenerative thermal oxidation systems operate on the same principal of reacting VOC in the presence of oxygen at elevated temperatures; however, the heat generated by combustion of auxiliary fuel and VOC is "reused" to reduce the amount of auxiliary fuel necessary for VOC oxidation. VOC oxidation is accomplished by passing the emission stream being controlled through a heated "bed" of media such as ceramic packing to preheat the emission stream, followed by a final combustion zone in which auxiliary fuel is burned to "boost" the stream to the required combustion temperature. Exhaust from the combustion zone is then passed through another packed bed, which absorbs and retains heat until it can be used to preheat the exhaust stream. Air flow is periodically switched to allow beds through which hot exhaust gases have passed to preheat the emission stream prior to passing through the combustion zone. Regenerative systems are typically designed to recover nearly all of the heat of combustion, greatly reducing auxiliary fuel requirements. Thermal oxidation is most economical when the inlet concentration is between 1500 and 3000 ppmv VOC because the heat of combustion of the hydrocarbon gases is sufficient to sustain combustion with the addition of expensive auxiliary fuel.
The units must be designed to accommodate the highest kiln exhaust rate at lowest VOC concentrations and handle the lowest expected flow rate at the high exhaust rate at high concentrations. The range of exhaust flow rates and concentrations is so large that the unit would overload and shutdown. In addition to these challenges, capturing the exhaust from a continuous kiln is complicated because a large fraction of the exhaust would escape through the open ends (where the lumber enters and exits the kiln). These ends must remain open to support the continuous nature of the process. Adding forced exhaust inside the kiln will disrupt the humidity and temperature gradients required for heat transfer and lumber conditioning. Since the airflow cannot be effectively captured, this add-on control device is not feasible.

<u>Work Practices</u>

The VOC emissions from lumber kilns are primarily generated as a result of drying the wood in the continuous kiln and to a lesser extent, wood combustion in the boilers. Emissions of VOCs is largely proportional to the amount of moisture removal from the lumber (e.g., the longer the lumber is dried, the higher the VOC emissions).

The naturally occurring VOCs in the lumber are driven off from the heat used to dry the lumber. Lumber must be dried to a specific moisture content to have the correct properties for the customers. However, over drying of the lumber would result in poor lumber quality and in the release of additional VOCs. Therefore, the optimal control of moisture levels is necessary to maintain the lumber quality and minimizing VOC emissions.

The RBLC database shows several wood products facilities that evaluated controls for VOC on kilns and none of these facilities have add-on controls; rather, they utilize good operation and maintenance practices to minimize VOC emissions.

iii) Step 3 - Ranking of VOC Control Technologies

Based on the results of Step 2 of the BACT analysis, all control technologies except proper maintenance and operation were deemed technically infeasible therefore; proper maintenance and operation represents BACT for the control of VOC emissions from the steam-heated continuous lumber drying kilns.

Control Technology	VOC control efficiencies %
Work Practices	base case

iv) Step 4 – Evaluate Control Options:

In the fourth step, a cost effectiveness and environmental and energy impact analysis is required. If the top level of control is selected as BACT, then a cost effectiveness evaluation is not required. An element of the environmental impacts analysis is the consideration of toxic or other pollutant impacts from the control alternative choice. The economic analysis, if necessary, is generally performed using procedures recommended by the EPA's OAQPS Control Cost Manual (sixth edition).

The most stringent or "top" control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent control alternative is evaluated in the same manner. This process continues until BACT is selected. Proper maintenance and operation is the only remaining control technology for the continuous lumber drying kiln. The other control technologies that were evaluated have not been proposed or demonstrated for use on a continuous lumber drying kiln.

Control Option	Cost /Ton	Economical	Environmental Impact	Energy Impacts
Proper maintenance and operation	$0	Yes	No significant impacts	None

v) Step 5 – summarize the selection of BACT:

The final step is to summarize the selection of BACT and propose the associated emission limits or work practice standards to be incorporated into the permit plus any recommended recordkeeping and monitoring conditions. The DEQ and the applicant performed an extensive search for BACT evaluations for both direct-fired and continuous steam heated lumber kilns (See Attachment 1 of this review). All the findings showed that none of the facilities used any control devices for the control of volatile organic compounds for lumber kilns, but rather used work practice standards. Therefore, proper maintenance and operation is the remaining VOC control technology for this project and is the proposed BACT for the steam-heated continuous lumber drying kiln. Data is limited concerning the level of emissions reduction expected through proper maintenance and operation of a kiln. Proper maintenance of the kiln will primarily affect the steam efficiency of the unit and the associated indirect emissions generated by the steam source (in this case, boilers). Proper maintenance will also maximize the lumber drying capacity achieved from a given quantity of fuel combustion. Proper operation of kiln primarily involves the thoughtful design of temperature profiles throughout the kiln and selection of final lumber moisture content. Operating the kiln at higher than ideal temperatures has the potential to drive off additional, higher molecular weight organic constituents from the wood. Similarly, drying the wood for a longer period of time to reach lower final moisture content has the potential to increase volatilization of organic constituents. However, increasing the operating temperature of the kiln and over-drying the lumber would both increase the cost of operating a lumber drying kiln. As such, the same conditions needed to minimize emissions from a kiln also minimize costs and improve profitability. Wholesale lumber market specifications generally establish the maximum allowable moisture content for a given grade of lumber or end-use of the product. Due to these factors, the impact on kiln emissions associated with operating procedures is likely to be small.

As a result of the above BACT analysis which indicate that there are no feasible control technologies for control of VOC emissions from steam-heated continuous lumber drying kilns, the BACT limit proposed by the applicant for the new steam heated continuous kiln (K-6) is 4.09 lbs of VOC as pinene/1,000 bf (board feet). This limit was established for the similar continuous steam heated kiln K-7 previously and the BACT limit reflects the NCASI emission factors for kilns at the time it was established. In July 2007, the DAQ revised VOC emissions factors for kilns in its “Wood Kiln Emissions Calculator Revision C” based an analysis of NCASI and EPA emission factors. Jordan Lumber has used the revised emission factors in calculating its emission reporting for many years. On June 21, 2016, Jordan Lumber submitted an amendment to the permit application (Application No. 6200015.16B) requesting the BACT limits in the permit be revised to reflect the DAQ’s current VOC emission factors for kilns. The current emission factor for a steam heated kiln is provided in the following table.

Table 6 – BACT Limits

Emission Source	Pollutant	BACT Limit
Steam-heated Lumber Kiln (K-6)	VOC	4.09 lb VOC/1,000 bf, as pinene

Work Practice Requirements

Total VOC (lbs/1000 BF) is computed based on the following equation:
VOC as pinene + methanol + formaldehyde = VOC as Carbon [lbs/1000 BF] * 1.133 + (1 - 0.65) * Methanol [lbs/1000 BF] + Formaldehyde [lbs/1000 BF].

The above methodology is supported in an [9]EPA study of “Interim VOC Measurement Protocol for the Wood Products Industry – July 2007.”

The limit of 4.09 pounds volatile organic compounds per thousand board feet (bf), as pinene is incorporated for the steam-heated continuous double track lumber kiln (K-6) in Section 2.1 D. 4. a. i., of the modified permit.

[9] http://www.epa.gov/ttnemc01/prelim/otm26.pdf

To ensure compliance the applicant shall keep records on a monthly basis of the types of woods processed in the kiln and note the total throughput (thousand board feet) for each type of wood processed. The applicant shall also shall maintain a 12-month rolling average of less than 93 million board feet per year (million bf/yr) from the continuous double track lumber kiln (ID No. K-6) and submit a semi-annual summary report to DAQ. These requirements are stipulated in Section 2.1 D. 4. b., of the modified permit.

DAQ is not imposing a "drying to appropriate moisture content" as required for some facilities in the RLBC search as a "work practice" to allow the facility the flexibility of operation.

VII. Air Quality Impact Analysis

PSD regulation 40 CFR 51.166(k) requires that an air quality analysis of the ambient impacts associated with the construction and operation of the proposed source or modification be performed. The analysis should demonstrate that the emissions from the proposed major source or modification, in conjunction with existing sources, will not cause or contribute to a violation of any applicable NAAQS or PSD increment. The proposed modification does not result in an increase of criteria pollutants above the PSD significant thresholds except for VOC emissions. The above BACT review for VOC emissions was done per the "source obligation" provisions of the PSD regulations 40 CFR 51.166(r) and in accordance with "source impact analysis" as per 40 CFR 51.166(k). The EPA has not established an acceptable ambient monitoring method for VOC emissions. Therefore, there are no modeling requirements for this pollutant.

Volatile Organic Compounds (VOCs)

VOC emissions in combination with NOx and sunlight, is a precursor to ozone formation. Previous and on-going regional air dispersion modeling efforts associated with attainment planning within the North Carolina air shed have shown that a VOC emissions increase of 144 tpy will not contribute to significant ozone formation. No additional monitoring or modeling is required to demonstrate that the proposed project will not result in an exceedance of any Class I Area increment standards. However, a Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool was performed to show compliance with ozone. Jordan Lumber used the MERPs values, established by EPA, for the Eastern United States. Conservatively Jordan Lumber shows the project emission increases for VOCs and NO_x compared to the Eastern United States MERP as a percentage of significance. Project emissions are well below the EPA MERPs values.

VIII. Additional Impact Analysis

A. Local Visibility, Soils, and Vegetation

PSD regulation 40 CFR 61.166(o)(1) requires that applications for major modifications include an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the proposed modification and the associated commercial, residential, industrial, and other growth. The analysis need not include an evaluation of the impact on vegetation having no significant commercial or recreational value.

Atmospheric ammonium sulfate [$(NH_4)_2SO_4$], which likely increases in concentration with increased SO_2 emissions to the atmosphere, is the major contributor to visibility impairment in

North Carolina. The proposed project, which is anticipated to have an increase in VOC emissions from the facility, is not anticipated to have any impact on local visibility impairment.

Gaseous air pollutants can potentially cause harmful acute, chronic, and long-term effects on vegetation. Acute and chronic effects are caused by the pollutant acting directly on the organism, while long-term effects are indirectly caused by secondary agents, such as changes to soil pH.

VOCs, along with NO_x and sunlight, is a precursor to ozone formation. Ground-level ozone can have detrimental effects on plants and ecosystems, including:

- Interference with the ability of plants to produce and store food, making them more susceptible to certain diseases, insects, other pollutants, competition and harsh weather;
- Damage to leaves of trees and other plants, negatively impacting the appearance of urban vegetation, National Parks, and recreation areas; and,
- Reduction of crop yields and forest growth, potentially impacting species diversity in ecosystems.[10]

This facility is located in a lightly populated and developed area of North Carolina and ambient concentrations of ozone in this area are in attainment with the NAAQS for this pollutant. Recent developments in air dispersion modeling and studies in ozone formation seem to indicate that even substantial reductions in VOC emissions in rural areas such as the Montgomery County complex will have a relatively small impact on ozone formation. The formation of ozone in North Carolina has been shown to be NO_x-limited. It should also be noted that VOC emissions from the lumber kilns are small compared to the biogenic (naturally occurring) VOC emissions from forests in the vicinity of the facility and, consequently, any reduction of VOC emissions from the lumber kilns will negligibly reduce ozone formation and concentrations in the area, while installation of a RCO or RTO that generates NO_x emissions from the combustion of supplemental fuel would likely help to increase ozone formation in the area.

The only impact on soils and vegetation associated with the proposed project would be associated with long-term damage associated with elevated ozone levels. The atmosphere in the region is considered NO_x-limited with regards to ozone formation. That means that there is already an excess of VOC in the atmosphere with respect to ozone production. Further, it has been estimated that 90% of VOC emissions occur from biogenic sources; with industrial facilities accounting for only 2% of those emissions[11]. Given the small quantities emitted by this facility (when compared to the overall regional VOC budget), into an already VOC-rich atmosphere, any change in ozone formation associated with the project, and thus the potential for harmful impacts on soils and vegetation will be negligible."

B. <u>Growth Impacts</u>

PSD regulation 40 CFR 61.166(o)(2) requires that applications for major modifications include an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial, and other growth associated with the proposed modification.

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[10] U.S. Environmental Protection Agency. (March 6, 2007). Ground-Level Ozone, Health and Environment. Retrieved February 8, 2008 from U.S. EPA website: http://www.epa.gov/air/ozonepollution/health.html

[11] Presentation entitled, *Modeling Application Process*, by NCDAQ – Attainment Planning Branch, September 30, 2004

Associated growth includes residential and commercial/industrial growth resulting from the new facility. Residential growth depends on the number of new employees and the availability of housing in the area, while associated commercial and industrial growth consists of new sources providing services to the new employees and the facility.

The project will consist of the construction and operation of new kilns at the existing facility. There will be temporary jobs associated with source construction, but no additional permanent jobs will be required to staff the modified facility. The new kilns will result in an increase of wood delivery trucks traveling along roadways to the site, but there will be no infrastructure changes except paved roads within the facility, itself. Since there will be no workforce or infrastructure expansions, any growth in the area related to the project will be minimal to nonexistent.

C. Visibility Impacts on Class I Areas

PSD regulation 40 CFR 61.166(p) provides an opportunity for the Federal Land Manager (FLM) to determine whether the proposed modification would have an adverse impact on an air quality related value (AQRV), including visibility, on any Class I areas.

A visibility analysis is not required for this project because the project does not result in a net significant emission increase for any pollutants (PM_{10}, NO_x or SO_2) that would be of concern for potential visibility impairment. However, the Federal Land Manager (FLM) was provided a copy of the pre-application form, and since no comments were received from the FLM, they were not provided a copy of the PSD application.

D. Air Quality Monitoring Requirements

In accordance with the requirements of 40 CFR 51.166(m)(1)(i)(b), a project that results in a net significant emissions increase must contain an analysis of existing ambient air quality data in the area to be affected by the proposed Project. Since the project does result in a net significant increase of a PSD-regulated pollutant (VOC), this analysis is required.

There are no National Ambient Air Quality Standards (NAAQS) for VOC and as per 40 CFR §81.334 “Designation of Areas for Air Quality Planning Purposes” (North Carolina – Montgomery County) the National Ambient Air Quality Standards (NAAQS) are as mentioned below:

Pollutant	NAAQS Standards
TSP	Better than national standards
1971 Sulfur Dioxide NAAQS (Primary and Secondary)	Better than national standards
Carbon Monoxide	Unclassifiable/Attainment

1997 Annual PM2.5NAAQS	Unclassifiable/Attainment
1997 24-Hour PM2.5 NAAQS	Unclassifiable/Attainment
2006 24-Hour PM2.5 NAAQS	Unclassifiable/Attainment
NO2 (1971 Annual Standard)	Cannot be classified or better than national standards
1997 8-Hour Ozone NAAQS (Primary and Secondary)	Unclassifiable/Attainment
2008 8-Hour Ozone NAAQS (Primary and secondary)	Unclassifiable/Attainment

However, 40 CFR 51.166(m)(1)(ii) calls for "the plan … with respect to any such pollutant for which no National Ambient Air Quality Standard exists, the analysis shall contain such air quality monitoring data as the reviewing authority determines is necessary to assess ambient air quality for that pollutant in any area that the emissions of that pollutant would affect."

Mr. Alex Zarnowski, of this Section's Air Quality Analysis Branch (AQAB) performed an air quality impacts to the air shed on July 6, 2018. This analysis was for this project and his analysis is as mentioned below:

"Pre-construction ozone monitoring was addressed with the closest monitor to Jordan Lumber located at the Blackstone monitor, located in Sanford, NC. The latest ozone 3-year design value provided by North Carolina Division of Air Quality for Montgomery County is 60 ppb, below the National Ambient Air Quality Standard of 70 ppb.

Using EPA Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool to show compliance. Jordan Lumber used the MERPs values, established by EPA, for the Eastern United States. Conservatively Jordan Lumber shows the project emission increases for VOCs and NO_x compared to the Eastern United States MERP as a percentage of significance. Project emissions are well below the EPA MERPs values. The table below shows the project increases compared to the Eastern Region MERP for VOC and NOx.

Table 1. Project emissions compared to the MERPs.

Compound	Emissions (tpy)	MERP (tpy)	% of Significance
VOC	143.6	1159	12.4 %
NO_x	13.7	170	8.1 %

From the table above, the total project impacts are well below significant impact levels, thus the project is expected to have insignificant impacts on ozone concentrations to the air shed."

DAQ has determined that no additional monitoring is required than as specified in Section 2.1 D. 4. b., of the modified permit.

IX. PSD Increment Tracking:

The Minor Source baseline for Montgomery County has been triggered for increment tracking under PSD for PM_{10} and NO_x emissions.

The project increase for the above pollutants are as mentioned below:
PM_{10} = 20.36 tons per year (4.64 pounds per hour)
NO_x = 30.46 tons per year (6.95 pounds per hour)

For PSD increment tracking purposes, PM_{10} emissions from this modification are increased by 4.64 pounds per hour and nitrogen dioxide emissions from this modification are increased by 6.95 pounds per hour.

The values for PM_{10} and NO_x will be added to the second page of the cover letter for increment tracking purposes.

X. NSPS, NESHAPS, Attainment Status, CAM, Compliance Status, Zoning Consistency Determination and Application Type.

NSPS
The proposed Kilns are not subject to any NSPS regulations.

NESHAP/MACT
The facility is a major source of HAPs and is subject to 40 CFR Part 63, Subpart DDDD "Plywood and Composite Wood Products" MACT.

CAM
The proposed Kilns do not have any control device and thus not subject to a CAM plan.

Compliance Status
The latest inspection was done on 11/27/2018 by Mr. Jeffery Cole of the Fayetteville Regional Office. The inspection report cited several Notice of Violations starting from 2014 to 2017.

An NOV was issued to the facility on 12/20/2018 regarding late initial notification of compliance status for boilers B01 and B03.

The inspection report also cited some discussions between Mr. Joe Voelker, the Regional office staff and myself. The issue was regarding additional inspection and monitoring requirements for the newly added electrostatic precipitator ESP-1 and ESP-2. However, later in a phone message from Mr. Cole he said this issue has been resolved in discussion with Mr. Voelker. The Regional Office will have an opportunity to review the draft permit and make additional comments or suggestions. The conclusion of the inspection report was "based on observations made during the inspection on 11/27/2018, Jordan Lumber & Supply Co. appeared to be operating in compliance."

The Regional Office, the applicant, and the SSCB (Stationary Source Compliance Branch) were provided a copy of the modified draft permit for this application and their comments were taken into account.

Consistency Determination

The applicant did notify the County planning and zoning Department of their intention to construct the new kiln. The County acknowledged acceptance of this notification and the planning director for the County stated “the proposed operation is consistent with applicable zoning ordinance.”

Application Type

The “two-step” method (as per 15A NCAC 2Q .0504) where the facility submits the required Title V application within one year of commencement of operation of the project, is not possible since the BACT limits for the continuous lumber kiln (K-6) including the **new** annual production limits will contravene the facility existing limit for VOC emissions, in the current permit. This application will be processed as a Significant 2Q .0501(c) modification (i.e., “one step”) it will be subject to a 30-day public notice and 45-day EPA review.

XII. Changes made in the proposed Permit.

The following changes were made to the Permit for this project:

Pages	Section	Description of Changes
4	Emissions source table	Added indirect steam heated continuous double track lumber kiln (K-6)
5	2.1 A. (summary of limits and standards)	Added recordkeeping and reporting of actual emissions from Boilers (ID Nos. B01 through B05)
19	2.1 D.	Added indirect steam heated continuous double track lumber kiln (K-6)
20 through 21	2.1 D. 4.	Added kiln (K-6) to the 2D .0530 requirements.
23	2.1 E.	Added recordkeeping and reporting of actual emissions from Boilers (ID Nos. B01 through B05)
29	2.2 B. 1.,	Added 2D .0530(u) requirements for the boilers
31 through 44	General Conditions	Updated

Attachment 1

The DEQ performed a search of the [12]RACT/BACT/LAER Clearinghouse with the following parameters: (Country: USA, from: 1/1/2005 to: 2/19/2018, Process type: 30.800 Wood Lumber Kilns, Process Name Contains: Continuous or "Direct Fired," Pollutant: VOC) produced the results as summarized in the table below:

Facility Name	RBLC ID	Permit Issuance Date	Limits	Notes
Bibler Brothers Lumber Company	AR-0101	8/25/2008	3.8 lb/mbf 46.5 lb/hr/kiln	Two Continuous Direct Fired Kilns each process lumber at a rate of 12.1 thousand board feet/hr.
West Fraser - Maplesvile Mill	AL-0258	04/15/2013	3.7600 LB/MBF	Throughput: 200.00 MMBF/YR
West Fraser - Newberry Lumber Mill	SC-0151	04/30/2013	3.7600 LB/MBF 376.0000 T/YR	Two, 35 mmbtu/h dual path, direct fired, continuous lumber kilns, 15 thousand bf/h, each. The VOC limits are total VOC, not on an "as carbon" basis. Facility will be required to test one kiln to verify the VOC emission factor used.
Kapstone Charleston Craft LLC	SC-0163	01/20/2015	225.6 tpy 3.76 lbs/1000 bf	Direct-fired kiln No controls, proper maintenance
Simpson Lumber Company, LLC	SC-0164	07/06/2016	156 tpy 3.76 lbs/1000 bf	Convert steam heated kiln to a direct-fired batch kiln No controls, proper maintenance
New South Companies, Inc-Conway Plant	SC-0165	10/15/2014	602 tpy 4.2 lbs/1000 bf	Convert steam heated kiln to a direct-fired batch kiln No controls, proper maintenance
Resolute FP US Inc Catawba Lumber Mill	SC-0181	11/03/2017	5.82 lbs/1000 bf as Terpene + Methanol + Formal dehyde	3 Continuous Direct-Fired Lumber Kilns, No controls, proper maintenance
West Fraser Inc. - Lumbe Mill	TX-0607	12/15/2011	-	Two continuous lumber kilns 275.00 MMBF/YR Proper temperature and process management; drying to appropriate moisture content

Also reviews of several facilities in other states with similar projects, that were not listed in the RBLC were reviewed.

[12] http://cfpub1.epa.gov/rblc/index.cfm?action=Search.BasicSearch&lang=eg

State Agency	Facility	Permit	Purpose	BACT Limit
Arkansas Department of Environmental Quality	Deltic Timber Corporation	Air Permit # 0592-AOP-R11	Convert a batch kiln to a continuous kiln. (No information on the hourly mmbf processing rate)	VOC: 38.2 lb/hr
Alabama Department of Environmental Management	Southern Parallel Forest Products	Air Permit No. X006	The proposed CDK with production capacity of 110 mmbf /yr with a directly heated by a 35 million Btu/hr wood-fired burner.	4.78 lb/1000 bd-ft
South Carolina Department of Health and Environmental Control Bureau of Air Quality	New South Lumber Company - Darlington	Permit No. 0820-0045-CK	New direct-fired, continuous lumber kiln with drying capacity 85 mmbf /yr with a 35 million Btu/hr green sawdust-fired gasifier burner.	Work practice standards. VOC emissions are based on an emission factor of 5.824 lb/ 1000, bd-ft (as terpene + methanol + formaldehyde)
State of Georgia - Department of Natural Resources Environmental Protection Division - Air Protection Branch Stationary Source Permitting Program	Langdale Forests Products Company	AIRS Number: 04-13-185-00009 Application Number: 18039	Increase production and remove earlier limits	4.6 lb VOC/1,000 board feet lumber dried.
State of Georgia - Department of Natural Resources Environmental Protection Division - Air Protection Branch Stationary Source Permitting Program	Simpson Lumber Company, LLC Meldrim Operations	AIRS Number: 04-13-103-00004 Application Number: 20735	The proposed project will convert Kiln 3 from batch to continuous operation, which will increase the drying capacity of Kiln 3 from 42.0 million board feet per year to 65.0 million board feet per year, and construct a new direct-fired batch lumber drying kiln (Kiln 4) with a capacity of 73.0 million board feet per year.	3.83 lb VOC/1,000 board feet lumber dried
South Carolina Department of Health and Environmental Control Bureau of Air Quality	New South Lumber, Inc – Conway Plant		New steam heated continuous kiln	442 tons/yr VOC (steam-heated kilns) 4.2 lb VOC (as terpene + methanol + formaldehyde) /1000 bf **************** 160 tons/yr VOC (direct-fired Kiln) 3.76 lb VOC (as terpene + methanol + formaldehyde)/MBF

				No controls
Oklahoma Department of Environmental Quality	Weyerhaeuser Company Wright City Pine Lumber Mill		Upgrade steam heated kilns	4.8 lbs/1000 bf No controls
Geogia Department of Natural Resources Air Protection Branch	Jordan Forest Products		Adding batch and continuous lumber drying kilns	4.0 lbs/1000 bf No controls
Alabama Department of Environmental Management	Southern Parallel Forest Products Albertville Sawmill	Facility No. 711-SOOl Air Permit No. X006	Adding a continuous direct-fired lumber kiln	4.78 lbs/1000 bf as WPP1 VOC No controls

The applicant also did a search of the RACT/BACT/LAER Clearinghouse and the results are listed below.

RBLC - VOC BACT Determinations for Lumber Kilns:

RBLCID	Facility Name	Process Name	Primary Fuel	Input	Control Method	Limits
AL-0257	WEST FRASER-OPELIKA LUMBER MILL	Two (2) 87.5 MMBF/YR Continuous kilns with a 35 MMBtu/hr direct-fired wood burner	Wood Shavings	175 MMBF/YR		3.76 LB/MBF AND 175 K/12 MONTHS
AL-0258	WEST FRASER, INC. - MAPLESVILE MILL	Two(2) 100 MMBF/Y Continuous direct fired kiln	Wood Residuals	200 MMBF/YR		3.76 LB/MBF
AL-0273	MILLPORT WOOD PRODUCTS FACILITY	Continuous direct-lumber dry kiln	Green sawdust	140000 mbf/yr	Proper maintenance & operating practice requirements.	4.7 LB/MBF VOC
AR-0101	BIBLER BROTHERS LUMBER COMPANY	SN-07G AND SN-13G CONTINOUS OPERATING KILNS	WOOD RESIDUE	25 MMBTU/H		3.8 LB/MBF VOC AND 46.5 LB VOC/H/KILN
AR-0120	OLA	Drying Kiln No. 5 (SN-21)	wood residue	60 MMBF/yr		23.5 LB/H
AR-0143	CADDO RIVER LLC	CONTINUOUS LUMBER DRYING KILNS	WOOD	1.16E+08 BOARD FEET		53.2 LB/H AND 220.4 T/YR

RBLCID	Facility Name	Process Name	Primary Fuel	Input	Control Method	Limits
FL-0340	PERRY MILL	Direct-fired lumber drying kiln	Waste wood	90 million board ft/yr	At a minimum, the permittee shall operate the kiln in accordance with the following best operating practices (BMP). a. Minimize over-drying the lumber; b. Maintain consistent moisture content for the processing lumber charge; and c. Dry at the minimum temperature. The permittee shall develop and operate in accordance with a written plan to implement the above BMP and any others required by the kiln manufacturer. Ninety days before the initial startup of the kiln, the permitted shall submit to the Compliance Authority the BMP plan. The Title V air operation permit shall include the submitted BMP plan.	3.5 LB/THOUSAND BOARD FT
FL-0343	WHITEHOUSE LUMBER MILL	Direct-Fired Continuous Kilns	Wood waste	40 MMBTU/H	Proper Maintenance and Operating Procedures: -Minimize over-drying the lumber. - Maintain consistent moisture content for the processing lumber charge. - Dry the lumber at the minimum temperature. - Develop a written Operation and Maintenance (O&M) plan identifying the above practices and the operation and maintenance requirements from the kiln manufacturer. - Record and monitor the total monthly amount and 12-month annual total of wood dried in each kiln (board-feet). - Record the calculated monthly and 12-month annual total emissions of VOC to demonstrate compliance with the process and emissions limits.	3.76 LB/THOUSAND BOARD FT
FL-0358	GRACEVILLE LUMBER MILL	Direct-fired continuous lumber drying Kiln No. 5	Sawdust	110000 Thousand bf/yr	Lumber moisture used as proxy for VOC emissions -- product that is over dried likely means more VOC driven off and emitted	3.5 LB/THOUSAND BF

RBLCID	Facility Name	Process Name	Primary Fuel	Input	Control Method	Limits
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	KILN 3	WASTE WOOD	65000000 BF/YR	PROPER MAINTENANCE AND OPERATION	3.83 LB/MBF
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	KILN 4	WASTE WOOD	73000000 BF/YR	PROPER MAINTENANCE AND OPERATION	3.93 LB/MBF
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	Wood-Fired Dry Kiln No. 1	Wood	60000 MBF/YR	Proper kiln design & operation; annual production limit	29.27 LB/H AND2.96 LB/M BF
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	Wood-Fired Dry Kiln No. 2	Wood	60000 MBF/YR	Proper kiln design & operation; annual production limit	29.27 LB/H AND 2.96 LB/M BF
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	Wood-Fired Dry Kiln No. 3	Wood	60000 MBF/YR	Proper kiln design & operation; annual production limit	29.27 LB/H AND 2.96 LB/M BF
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	Wood-Fired Dry Kiln No. 4	Wood	60000 MBF/YR	Proper kiln design & operation; annual production limit	29.27 LB/H AND 2.96 LB/M BF
SC-0136	SIMPSON LUMBER COMPANY, LLC	DIRECT-FIRED LUMBER DRYING KILN NO. 4	DRY WOOD WASTE	34 MMBTU/H	WORK PRACTICE STANDARDS	104 T/YR AND 3.8 LB/M BF
SC-0138	ELLIOTT SAWMILLING COMPANY	DIRECT FIRED LUMBER DRYING KILN NO.5	SAWDUST	35 MMBTU/H	WORK PRACTICE STANDARDS	119 T/YR AND 4.5 LB/M BF
SC-0151	WEST FRASER - NEWBERRY LUMBER MILL	TWO - 35 MMBTU/H DUAL PATH, DIRECT FIRED, CONTINUOUS LUMBER KILNS, 15 THOUSAND BF/H, EACH	SAWDUST		PROPER OPERATION AND GOOD OPERATING PRACTICES	3.76 LB/MBF AND 376 T/YR
TX-0584	TEMPLE INLAND PINELAND MANUFACTURING COMPLEX	Dry studmill kilns 1 and 2	wood	156000 boardfeet per charge	good operating practice and maintenance	2.49 LB VOC/1000 BOARDFEET
TX-0607	LUMBER MILL	Continuous lumber kilns (2)	wood	275 MMBF/YR	proper temperature and process management; drying to appropriate moisture content	3.5 LB/MBF

All these findings showed that none of the facilities used any control devices for the control of VOC emissions from lumber kilns but rather used “work practice” to control emissions.